

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SUPPLEMENT**

International Reference  
PCT/CH 03/00616

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**Item I**

Valid claims 1 to 16 satisfy the requirements of article 34(2)(b) of the PCT. However, the expression "after molding" is missing in claim 14.

**Item V**

**Substantiated determination relative to novelty, inventive activity and commercial applicability; documents and declarations in support of this determination.**

1. Reference is made to the following documents:  
D1: DE 100 22 095 A (CELANESE VENTURES GMBH), November 22, 2001 (2001-11-22).  
D2: US-A-5 989 620 (WANG NING ET AL), November 23, 1999 (1999-11-23).  
D3: US-A-3 836 680 (SALZA S), September 17, 1974 (1974-09-17).  
D4: FR-A-2 815 518 (NESTLE SA), April 26, 2002 (2002-04-26).  
D5: US-A-5 281 432 (PLUTCHOK GARY ET AL), January 25, 1994 (1994-01-25).  
D6: US-A-4 590 084 (BELL HARVEY ET AL), May 20, 1986 (1986-05-20).  
D7: US-A-5 451 423 (NOEL JEAN), September 19, 1995 (1995-09-19).  
D8: US-A-5 429 834 (ADDRESSO KEVIN ET AL), July 4, 1995 (1995-07-04).  
D9: US-A-5 104 669 (WOLKE MARK ET AL), April 14, 1992 (1992-04-14).

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2. Articles 33(2) & (3) of the PCT

The phase consisting of the starch network in part a) of claim 1 and the disperse phase in part d) of claim 1 can be interpreted as describing the same phase. As a consequence, the matrix consisting of starch gel in part d) is the foodstuff in part a) itself.

Due to the lacking clarity (Art. 6 of the PCT) of the newly inserted features, the area of protection for the claimed subject matter has not changed.

Since;

- each gelatinizable starch can be viewed as "network-capable",
- the definition of NS and VS overlap, causing the term "heterocrystal" to lose it's meaning or become unclear (Art. 6 of the PCT). In addition, most starch grains can also be regarded as heterocrystals, because they generally contain amylose and amylopectin.
- Starch in heat-treated foodstuffs, e.g., bread, pasta, will have necessarily been in an at least partially amorphous state at least once, i.e., the starch is present at least once in a state of largely released crystallization potential;

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the claimed subject matter cannot be distinguished from a foodstuff containing boiled or partially boiled starch.

D1 discloses starch networks for use in foodstuffs. D2 (ex.) discloses the extrusion of pasta at up to 135°C. D3 discloses gluten-free pasta and a manufacturing method based on a combination of gelatinized and non-gelatinized starch. D4 discloses gluten-free pasta made out of modified gelatinized starch, natural starch and gluten-free flour. D5 (ex. 8) discloses pasta made out of starch with a high amylose percentage and flour (wheat or corn) in order to increase boiling resistance. D6 (ex.) discloses the use of starch with a high amylose percentage for manufacturing canned pasta. D7 (ex. 1) discloses boiled and extruded cereal products containing preheated flour. D8 (ex. 1) discloses reconstituted chips containing another starch in addition to a pregelatinized waxy cornstarch. D9 (ex.) discloses pasta products containing a starch with high amylose and amylopectin content in addition to flour.

Therefore, the valid claim 1 is not novel (Art. 33(2) of the PCT).

Furthermore, the starch-gel matrix in part d) and the starch network matrix in part a) can be interpreted as being the same, since a starch network cannot be distinguished from a starch gel. In this case, the claimed subject matter cannot be distinguished from a foodstuff in part containing boiled starch, i.e., both boiled and non-boiled starch.

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The aforementioned relates *mutates mutandis* to the subject matter of claim 13. In addition, the subject matter of claim 13 does not define any procedural step, but rather the result to be achieved (PCT guidelines, C-III, 4.7).

The dependent claims contain no features that satisfy the requirements of the PCT relative to novelty when combined with the features of any of the claims to which they relate.

With respect to the formulation of part (b) of claim 1, the products characterized by a method for their manufacture are only possible if the products as such satisfy the preconditions for patentability (PCT guidelines, C-III, 4.7b) [Translator's note: German is a bit unclear in this paragraph).

In addition, the parameters in claims 7 to 9 and 11 are unusual, so that no sensible comparison can be made with prior art (PCT guidelines, C-III, 4.7a).

3. Specific published documents (Rule 70.10)

Application No.	Publication date	Application date	Priority date
Patent No.	(Day/Month/Year)	(Day/Month/Year)	(claimed as law)
			(Day/Month/Year)
WO 03/035026	5.1.2003	10.21.2002	10.23.2001 & 3.28.2002

pasta products often made out of expensive mung bean, and a demand exists for pasta products made of more favorable raw materials. On the other hand, the availability of grain varies greatly by region. Hard wheat is grown primarily in Canada and the U.S., in southern Europe, especially in Italy with 65% of the European hard wheat, in Russia and Kazakhstan, in Turkey and in North Africa, while the climatic conditions for hard wheat are either unsuitable in other regions and countries, or other grain types are cultivated there for traditional reasons. Developing countries would find importing hard wheat to be financially problematical, and have a distinct need for pasta products, which represent a nutritional, healthy and extremely durable foodstuff, made out of local and favorable, starch-containing raw materials. The new technology for manufacturing pasta products according to the invention makes it possible to take such regional characteristics into account. Pasta products according to the invention can be made out of various grain types, flours, raw and whole flours and starches, or rice, potatoes, sweet potatoes, tapioca, canna, pea, beans, lentils, sago, arrowroot, maranta, or also out of high-quality palm roots using favorable, local raw materials and cost-effective methods.

De 100 22 095 A1 describes starch gels obtained via poly-alpha-1,4-D-glucan (PG) and another starch. Since the highly crystalline PG was viewed as water insoluble, the PG solution was obtained using strong lyes. After mixing these lyes containing dissolved PG (potassium hydroxide with a starch solution), neutralization took place with an acid (ortho phosphoric acid), during which the PG precipitated, and formed a gel together with the starch macromolecules. Potassium phosphate also formed during neutralization.

However, a maximum of 12% PG could be dissolved even when using 1 molar KOH lye.

US 5281432 describes a method for manufacturing foodstuffs in which a powdery component is dispersed in an aqueous medium, and mixed with a foodstuff. This powdery component contains high amylose starch which was spray-dried or enzymatically debranched starch. In order to prepare the powdery component a slurry (suspension) is prepared which is subsequently atomized and dried.

Prior Art for Cereals, Snacks and Baked Goods

Cereals or cereals and snacks include both flaked cereals such as Corn Flakes or Frosties, along with puffed, i.e., expanded cereals like wheat snacks or crisp rice, and other cereals and snack types like chips, sweet and salty snacks, dough snacks, tacos or dips, as well as crackers, waffles or cookies. Baked goods includes both bread and bread products, along with other dough products, like pizza dough, crepes, and the like. Ethnic foodstuffs like tortillas, enchiladas, arepas, panquecas or cachapas are difficult to classify, but are also suitable for the use of starch networks.

There are numerous different methods in these foodstuff sectors. Continuous cooking extrusion is of particular importance, especially in the area of cereals and snacks. In addition, there are various batch methods, e.g., steam cooking methods, wherein in part very long cooking times are used

## CLAIMS

1. A foodstuff based on starch, flour, semolina and the like, characterized in that
  - a) the foodstuff has a phase or matrix consisting entirely or partially out of starch network; and
  - b) a component of the starch network is present at least once in a state of largely released crystallization potential during foodstuff manufacture, preferably dissolved or plasticized; and
  - c) the starch network is formed by a networkable starch component (NS) and an present starch component (VS) at least partially via the heterocrystallization of NS and VS; and
  - d) a disperse phase comprised of at least one VS component in the matrix consisting entirely or partially out of starch gel.
2. The foodstuff according to claim 1, characterized in that a portion of the starch in the matrix stems from the disperse phase.
3. The foodstuff according to one of the preceding claims, characterized in that
  - a) the foodstuff has an NS component, which is present at least once in a state of largely released crystallization potential during foodstuff manufacture, in particular in a partially amorphous state, preferably dissolved or plasticized, and



phase or matrix, wherein this phase in particular consists of interpenetrating networks.

7. The foodstuff according to one of the preceding claims, characterized in that the foodstuff, in the absence of nuclei in an excess of water at RT according to 1d, especially according to 3 d, preferably according to 7d, most preferably according to 14sd,
  - a) has a strength  $\sigma$  in MPa in a tensile test of  $> 0.1$ , in particular  $> 0.3$ , preferably  $> 0.7$ , most preferably  $> 1.1$ ; and/or
  - b) has an E modulus E in MPa in a tensile test of  $> 0.5$ , in particular  $> 1$ , preferably  $> 3$ , most preferably  $> 5$ ; and/or
  - c) has a water solubility S in % db of  $< 3$ , in particular  $< 1$ , preferably  $< 0.5$ , most preferably  $< 0.3$ .
8. The foodstuff according to one of the preceding claims, characterized in that the foodstuff based on the starch network has a percentage arrangement of resistant starches according to one of the claims in (%) of  $> 3$ , preferably  $> 5$ , in particular  $> 7$ , most preferably  $> 10$ .
9. The foodstuff according to one of the preceding claims, characterized in that the foodstuff based on the starch network has a glyceamic index peak that is reduced relative to a comparable conventional foodstuff by a factor of  $< 0.7$ , preferably  $< 0.5$ , in particular  $< 0.3$ , most preferably  $< 0.1$ .

10. The foodstuff according to one of the preceding claims, characterized in that the foodstuff is present as a pasta product, in particular as a dry product, ready-made fresh product, in instant form or as canned goods, as cereals, in particular as cereal flakes, as a snack or as baked goods.
11. The foodstuff according to one of the preceding claims, characterized in that the foodstuff consists of pasta products which, without admixed eggs or egg constituents in boiling water,
  - a) Have a waters solubility S after 15 minutes of < 5%, in particular < 3%, preferably < 2%, most preferably < 1%; and/or
  - b) Have a chewing consistency B after 6 minutes of > 200, in particular > 300, preferably > 400, most preferably > 500; and/or
  - c) Have a chewing consistency B in grams after 10 minutes of > 100, in particular > 150, preferably > 200, most preferably > 300; and/or
  - d) Have a chewing consistency B in grams after 30 minutes of > 50, in particular > 70, preferably > 100, most preferably > 130.
12. The foodstuff or a foodstuff additive according to one of the preceding claims, characterized in that the foodstuff or foodstuff additive is used as a gelling element, in particular comprised of an amorphous molecular disperse mixture of at least one NS and at

least one VS, wherein especially this mixture is present in a dried form, preferably in spray-dried or freeze-dried form, and is used as a binder and thickener for foodstuffs.

13. A method for manufacturing a foodstuff according to one of the preceding claims, which has a networkable starch component (NS) and a first present starch component (VS1), wherein, during foodstuff manufacture,
  - a) the NS component is present at least once in a state of largely released crystallization potential;
  - b) the first VS component VS1 is dissolved or plasticized; and
  - c) a state is achieved, wherein the NS component is present mixed with at least one portion of the component VS1 in a molecularly disperse manner, and
  - d) while or after shaping the foodstuff the network formation will be triggered, with the network elements of the starch network being formed by crystallites, which are formed at least partially via heterocrystallization of the NS component with at least one portion of the VS1 component.
14. The method according to claim 13, characterized in that conditioning is performed.
15. The method according to claim 13 or 14, characterized in that a drying process is performed after shaping.

16. The method according to one of claims 13 to 15, characterized in that the foodstuff has a second present starch component (VS2), wherein, during foodstuff manufacture, a state is reached, wherein the NS component is present mixed with at least one portion of at least one of the components VS1 and VS2 in a molecularly disperse manner; wherein the crystallites are at least partially formed via the heterocrystallization of the NS component VS1 and at least a portion of the component VS2.